

REMARKS

Preliminarily, Applicants respectfully request the Examiner to acknowledge the claim for foreign priority and receipt of the certified copy of the priority document (from the International Bureau).

Also, Applicants respectfully request the Examiner to make JP 09-241405 to Niino et al (corresponding to DE 19708373) of record. Form SB08 A&B is attached hereto.

Claim 3 has been amended to incorporate therein the recitation of claims 4 and 5. Claims 4 and 5 have been canceled. Also, claims 1, 2, 6, 7, 9, 10, 15, 17-20, 23-26 and 32-35 directed to a non-elected invention have been canceled, without prejudice. Applicants reserve the right to file a divisional application directed to the canceled subject matter.

Review and reconsideration on the merits are requested.

Claims 3-5, 8, 11-14, 16 and 27-31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 2003-047832 (JP '832) in view of U.S. 2002/0016250 to Hayakawa et al and DE 19708373 to Niino et al.

JP '832 was cited as disclosing a method of controlling fluid flow inside a microchannel by control of hydrophobing and hydrophilization. Although acknowledging that JP '832 discloses neither step (2) of releasing the substance, nor the use of light energy as a process control, the Examiner relied on Hayakawa et al as disclosing a process of irradiating a hydrophilization portion of a surface in order to decrease its contact angle. Niino et al was cited as teaching the process of releasing the substance, which substance is brought into contact with a hydrophilization surface to adhere to the surface and increase its contact angle. The reason for rejection was that it would have been obvious to modify the method of JP '832 so as to use irradiation of light to decrease the contact angle of the hydrophilization portion as taught by

Hayakawa et al, and to release a substance and bring it into contact with the surface of the hydrophilization portion to increase its contact angle as taught by Niino et al.

The rejection should be withdrawn because none of the cited references, alone or in combination thereof, teaches or suggests a change (switching) in fluid flow by applying an energy (i.e., irradiation). Particularly, the invention as claimed in amended claim 3 comprises (1) irradiating a hydrophilization portion constituting a surface of a microchannel to decrease a contact angle of water of the surface thereof; (2) releasing the substance for increasing a contact angle of water; (3) bringing the released substance into contact with the surface of the hydrophilization portion to adhere the substance and thereby increase the contact angle of water of the surface; (4) irradiating the hydrophilization portion to decrease the contact angle of water on the surface of the hydrophilization portion again; and repeating steps (2) to (4) to switch alternately passage of a fluid in the microchannel.

Turning to the cited prior art, JP '832 relates to a micro mixer designed for joining and reacting with liquids FA and FB introduced from introducing passages 11A and 11B, respectively, at a joint passage 12. A low affinity part having a lower affinity to each of the liquids FA and FB than that of the inside surface forming the introducing passages 11A and 11B, respectively, is provided on a part of the inside surface in the direct upstream side of a joint part 12a of the introducing passages 11A and 11B (Abstract).

Paragraphs [0031] and [0032] disclose selectively hydrophilizing or hydrophobing a portion of the wall surface 13, whereas those portions not to be altered are protected, for example, with a mask as described in paragraph [0033]. JP '832 does not contemplate reversible hydrophilization or hydrophobing so as to control fluid flow. Rather, a portion on the upstream

side of the joint part 12a is permanently altered so as to have a lower affinity to the liquids FA and FB so as to more easily and efficiently mix the same.

Therefore, there is no disclosure in JP '832 of utilizing control of hydrophobing and hydrophilization for controlling fluid flow inside of a microchannel as asserted by the Examiner.

Hayakawa et al discloses a method for photocatalytically rendering a surface of the substrate super hydrophilic. More particularly, Hayakawa et al relates to the antifogging art in which the surface of a transparent substrate such as a mirror, lens and sheet glass is made highly hydrophilic to thereby prevent fogging. Like JP '832, Hayakawa et al has nothing to do with controlling fluid flow in a microchannel or otherwise.

Niino et al (corresponding to JP 09-241405) discloses emission of highly reactive species from a matrix material by irradiation with an ultraviolet laser beam, which emitted species are made to contact a surface of a solid to modify the same (Abstract). Like JP '832 and Hayakawa et al, Niino et al also has nothing to do with controlling fluid flow. To more clearly highlight this distinction, claims 3, 4 and 5 have been combined. There is nothing in the cited prior art which discloses the concept of turning on and off the flow of fluid in a microchannel by increasing and decreasing the contact angle of a part of the inner surface of a microchannel.

Withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claims 3-5, 8, 11-13, 16 and 27-31 were provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 3, 4, 15 and 36-47 of copending Appln. No. 10/573,967.

Applicants respectfully request the Examiner to hold the provisional rejection in abeyance until the "provisional" double patenting rejection is the only rejection remaining in at least one of the applications.

Withdrawal of all rejections and allowance of claims 3, 8, 11-14, 16 and 27-31 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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